



U.S. Fish & Wildlife Service

Evaluating the Health of Our National Wildlife Refuges

Amphibian Deformities (Malformations)

Issue

National attention was focused on the issue of amphibian malformations in 1995, when a group of middle school students from Minnesota discovered large numbers of frogs with misshapen, extra, or missing limbs. In the last three years, an increasing number of frogs and toads with severe malformations have been observed throughout the United States, as well as in other parts of the world. Researchers have been investigating the problem at many levels, including conducting surveys, laboratory studies, and developing the North American Reporting Center for Amphibian Malformations (NARCAM), a clearinghouse for the collection and dissemination of information. Although several Federal agencies and researchers are involved in the amphibian decline and deformity issue, the U.S. Fish and Wildlife Service (Service), with the expertise provided by its Division of Environmental Contaminants, is uniquely suited to determine the exact role that contaminants, specifically pesticides, play in amphibian malformations.

Reason for Concern

The Service helps conserve habitat through the National Wildlife Refuge System, the world's largest and most diverse collection of lands set aside specifically for wildlife. To ensure the health of this habitat, Service environmental contaminant specialists monitor the effects of contamination on fish and wildlife found on National Wildlife Refuges. Many amphibian species are sensitive to a variety of environmental stresses and may be good early indicators of the health of their environment. For this reason, the Service has a keen interest in



The Sunhaze Meadows NWR where frog surveys are being conducted.

determining the cause of the frog deformity epidemic and whether this epidemic is also occurring on National Wildlife Refuges.

Outcomes

If pesticides currently being applied on refuges are linked to amphibian declines or deformities, then alternative actions and practices to help reduce or eliminate potential threats will be recommended. Integrated Pest Management (IPM) techniques can be implemented to remove the most harmful pesticides used for noxious weed control, mosquito control, and pest management on agricultural crops. The IPM approach incorporates cultural, biological, and physical pest control methods, and considers pesticides only as a last resort. When pesticide use is considered necessary,



A frog with a malformed leg.

chemicals that are the least toxic to amphibians will be considered first. If the Service determines that pesticides use on lands adjacent to refuges are the likely cause of amphibian malformations, the Service will work closely with the landowners to help determine whether there are other cost-effective and efficient pest control methods available to them.

What is Causing Amphibian Deformities?

Potential causes include:

- Changes in climate (increased UV-B light due to ozone depletion, acid rain, drought, etc.);
- predatory invasive species (e.g. trout and bullfrogs);
- parasites, bacteria, fungus, and viruses; and,
- pollution and contaminants (pesticides, heavy metals, fertilizer, etc.)

Scientists believe that not one, but rather a combination of factors are causing these problems.

Have Malformations Been Found On Any Refuges?

Due to the especially high incidences of frog deformities reported in Minnesota and Vermont, the Service's Northeast (Region 5) and Midwest (Region 3) Regions initiated surveys in 1997, which were designed to document the extent of frog malformations on National Wildlife Refuges. Of the 73 national wildlife refuges located in the Northeast



A frog missing a leg.

Region, a total of 17, along with Acadia National Park (Maine), received some level of sampling. To ensure that the number of refuges with "high" malformation rates was not overstated, the Service tripled the malformation rate observed in wetlands unaffected by agriculture in an earlier study. Malformation rates that could be considered high were then found on four of the Region's refuges:

- Iroquois in New York;
- Missisquoi in Vermont;
- Sunhaze Meadows in Maine; and,
- Great Bay in New Hampshire.

In the Service's Midwest Region, several refuges were found to have



A healthy adult leopard frog.

Photo credit: Corel Corp.

localized areas with high numbers of malformed amphibians.

In 1999, the Northeast Region conducted a second set of surveys.

High malformation rates were discovered in nine refuges:

- Rachel Carson and Moosehorn in Maine;
- Great Bay in New Hampshire;
- Great Swamp, E.B. Forsythe and Wallkill in New Jersey;
- Patuxent and Eastern Neck in Maryland; and,
- Eastern Shore in Virginia.

In addition, an effort was made to test for a relationship between contaminants on national wildlife refuges and incidences of malformed frogs (see attachment).

Are Any Refuges Being Surveyed in 2000?

Forty-three refuges in 31 states are scheduled to be surveyed in 2000. A list of these refuges is being provided as an attachment and can also be found on the Service's Division of



Green frogs

Environmental Contaminants web site's web page on amphibian deformities <http://contaminants.fws.gov/Issues/Amphibians.cfm>.

How do the Service's and USGS's Efforts Complement Each Other?

By directly focusing efforts on refuge lands, the Service can share information with the USGS and avoid duplication of efforts, maximize the information generated by the available funding, and implement actions that will maintain the integrity and health of the refuge system. Additional coordination will occur through a national coordinator participating in the Department's Taskforce on Amphibian Declines and Deformities workgroup, cooperation with other Interior and federal agencies, and maintaining awareness of the amphibian work being done nationwide.

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